

Operation and Instruction Manual

Morehouse GB2 High Stability GAUGE BUSTER



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Forward

The Morehouse GB2 High Stability Gauge Buster has been designed and constructed with great care in every phase of assembly. To ensure reliability, both the mechanical and electrical components have been built with the best available materials. Nevertheless, it has been proven that a thorough understanding of its operation and proper handling will return large dividends. The sections of this manual provide descriptions and instructions on the operation and maintenance of the mechanical, electrical, and software components.

You, as a customer, are our most valued asset. We take pride in our systems and are pleased that you have become an owner. We welcome your comments about our products and wish that you express them. This is the only way to continue building the best available test systems to satisfy your needs. Thank you for your support.

HOW TO USE THIS MANUAL

This manual is intended to educate the customer on the capabilities, operation, and maintenance of the Morehouse GB2 High Stability Gauge Buster. It is also to be used as a supplement to any information supplied by the load frame manufacturer. Maintenance procedures specified by the load frame manufacturer should be followed unless specifically noted herein. Read this manual and become familiar with the operation of your test machine before operating the Morehouse GB2 High Stability Gauge Buster.

TECHNICAL SUPPORT

If a problem should occur with your testing machine:

- Consult the troubleshooting section online and in this manual.
- Check that all external inputs are properly connected.
- Call Morehouse's technical support at +1 (717) 843-0081 (9 AM to 5 PM EST) or email us at info@mhforce.com

1. Introduction

The Morehouse GB2 High Stability Gauge Buster is a specialized high-resolution digital indicator designed to calibrate force. The indicator allows for storing many unique calibration profiles to be validated on any conventional load cell, with accuracy exceeding the criteria outlined in ASTM E4 from 1% of full scale to full scale. It features a simplistic interface allowing the user to log, store, and transfer up to 19 distinct sets (calibration tables) of ten calibration points to be fitted in a piecewise linear fashion. Its accuracy, ease of use, and ruggedness result in an unrivaled price/performance system.

1.1 Morehouse GB2 High Stability Gauge Buster Features

- Display Live Load and frozen load numerically.
- Select between force units of Lb, N, KN, kg.
- Transmit via the USB communications port results and calibration data to a remote computer running GaugeSafe™ Data Exchange Program.
- Store up to 19 load cell calibrations for multiple load cell systems. The load calibration algorithm allows up to 10 calibration points per cell with piecewise linear fit between points.

1.2 Morehouse GB2 High Stability Gauge Buster Options

- GaugeSafe™ Data Exchange Software
- Battery Pack-powered unit housed in a heavy-duty carrying case for portable applications.

1.3 Morehouse GB2 High Stability Gauge Buster Reporting Capabilities

1.3.1 GaugeSafe™ Data Exchange Program (optional)

GaugeSafe™ is a PC-based program for exchanging data with the Morehouse GB2 High Stability Gauge Buster. It is a Windows 7/8/10 compatible program and capable of viewing, printing and storing calibration session data uploaded via the USB communications port. GaugeSafe™ is sold separately.

2. Key Functions

2.1 The <ZERO/0> and/or <TARE> Key

The ZERO key performs the following functions:

- Defines a new zero load (tare).
- Clears out the previous calibration session data from the test buffer and initializes the indicator for the next calibration session.
- It enters the number zero.

2.2 The <STORE> Key

Not used.

2.3 The <Enter> Key

The ENTER key performs the following functions:

- Accepts/assigns the value in a data entry field to that field.
- Turns ON/OFF a menu option.

2.4 The <ESC> Key

The ESC key performs the following functions.

- Returns to the last menu or Live Indicating Screen.
- Clears a data entry mistake by restoring the original number in a data entry field.

2.5 The <UP & DOWN ARROW> Keys

The ARROW keys allow the operator to scroll through menu items.

2.6 The <NUMBER> Key

The NUMBER keys are used to select a menu option from within a menu or input a numerical value in a data entry field.

3. The Menu and Keys

3.1 The Setup Menu

Press the <Setup> key from the Indicating Screen to enter the Setup Menu. Use the <ARROW> keys to scroll through the menu items. Use the <NUMBER> keys to select the menu item. The following functions are provided in the Setup Menu.

1. **Load Cell.** Use to select load cell. You can select between valid load cell calibrations set up in the calibration menu.
2. **Encoder.** Not Used.
3. **Engineering Units.** Used to select between force units of Lb, N, KN, and Kg. Press <1> to change force units.
4. **Mode-Force.** Fixed to force calibrations.

3.2 The Report Opt Menu

Not used.

3.3 The ID# Menu

Not used.

3.4 The F1 Menu

Not used.

3.5 The Utils Menu

P Press the <Utils> key from the Indicating Screen to enter the Utils Menu. Use the <ARROW> keys to scroll through the menu. Press the <NUMBER> keys to select the menu item. The following items are found in the Utils Menu.

1. **Clear Results.** Erases all force calibration points stored in memory. Each time the user presses the button on the freeze cable, the selected/frozen force value is stored in memory.
2. **Set Date and Time.**
3. **Ck Trans-DOUT and I/O.** This function displays Input/Output status as well as the transducer readings in A/D counts. Possible A/D values are between -2,200,000,000 and +2,200,000,000.
4. **Install Defaults.** This is used to put all setup parameters in a known default state. Installing defaults DOES NOT affect any of the calibration information.
5. **Stream.** Fixed to ON to stream Live Force readings to the optional GaugeSafe™ Data Exchange program.
6. **Calibrate.** A password protected menu that allows the user to add new or modify existing force calibrations. See Section 5.0.

3.6 The Print Menu

Not used.

3.7 The Disk (-) Menu

The Disk (-)Menu is only useful when the optional GaugeSafe™ Data Exchange Program is paired with the indicator.

1. **Results->Host.** This transmits stored frozen force values for a calibration session to a pc running the GaugeSafe™ Data Exchange Program.
2. **Cal->Host.** Transmits transducer calibration tables to a pc running the GaugeSafe™ Data Exchange Program.

4. Operation

4.1 Initial Steps to Initiate a Calibration Session

Figure 4.1.1 depicts the front panel of the Morehouse GB2 High Stability Gauge Buster. The active calibration table is shown in the upper left corner of the display (Calibration Table C2 in Figure 4.1.1). Prior to starting the calibration session, select the engineering units and calibration table assigned to the force standard to be used for the calibration session. Connect the force standard to the DB15 port on the rear panel and allow 15 minutes for it to reach thermal equilibrium. Remove any load from the force standard and press the <ZERO> or <TARE> key to zero the indicator as shown in Figure 4.1.1.



Figure 4.1.1: Morehouse GB2 High Stability Gauge Buster Front Panel

4.2 How to Record Points During a Calibration Session

Once the initial steps in Section 4.1 have been completed, the user can now begin applying load to the force standard. As the load increases and surpasses the Class A lower limit as specified in the calibration menu, an "A" will appear in the lower left-hand corner of the display as shown in Figure 4.2.1. In addition, the force indicated on line 1 of the display is always live force. The force indicated on line 2 is either the live force or the force captured when the freeze cable button (Figure 4.2.2) is depressed. In Figure 4.2.1, line 2 is currently live force and matches the reading on line 1.



Figure 4.2.1 – Morehouse GB2 High Stability Gauge Buster Front Panel depicting the force above the Class A lower limit and both line 1 and 2 indicating live force.



Figure 4.2.2 – Freeze cable that connects to DB25 connector on rear of indicator.

Once the user achieves the desired force point, depress the freeze cable button to record the point to memory. Figure 4.2.2 depicts an “F” in the lower-left corner of the display, which indicates that the force indicated on line 2 is frozen to the value captured at the time the button was depressed. At the time the button was depressed, the force reading was also recorded in the data buffer. Line 2 will continue to display the force value captured at the button press until the user depresses the button again to release the reading. Once the reading is released, line 2 will indicate the live load.



Figure 4.2.2 – Front panel depicts line 2 with the frozen captured force value.

5. Calibration

Refer to Section 7.1 for details on transducer connections.

5.1 How to Calibrate Analog Transducers

You can calibrate up to 19 load cells to the Morehouse GB2 High Stability Gauge Buster. Each calibration can have up to 10 points.

Step 1: Turn on the system and allow it to run for 10 minutes before calibrating.

Step 2: Select the Engineering Units for calibration from the SETUP Menu. See Section 3.1 for more information.

Step 3: Select <6> Calibrate from the Utils Menu.

Step 4: Enter the password. Contact Morehouse technical support if you have lost the password.

Step 5: Enter a load cell number (calibration table) between 2 and 20.

Step 6: Select the engineering units to be used in the calibration.

Step 7: Input the full-scale range or the transducer's capacity. The range should be input in the currently active engineering units.

Step 8: Enter the class A range; if it is unknown, this can be changed after calibration..

Step 9: Input the resolution or minimum increment.

Step 10: Press <1> Set Cal Points to enter the measure mode or <2> to edit the force values for the selected calibrations table, or <ESC> to exit.

NOTE: If you exit the Calibration Menu at this time, the values entered for Full Scale, Class A Range and Resolution will be saved.

Required Information Before Continuing Calibration in Measure Mode

If <1> is pressed in Step 10, the program will enter the measurement mode. During this mode, the technician can take up to ten calibration point readings (at least 2 points are required).

NOTE: The first calibration point must be at zero load/force.

Taking a few more calibration readings in areas of greatest inaccuracy may be beneficial. The number next to “Set PT No” on the display will indicate how many calibration readings have been taken. As the calibration points are entered, write down the corresponding load value. After the ten calibration points have been taken, or the <STORE> key is pressed when using less than ten points, the Morehouse GB2 High Stability Gauge Buster automatically switches to engineering input mode. Input the load value corresponding to each calibration point reading stored. The calibration points are stored sequentially. The first point is zero, followed by the second, third, and so forth. Once engineering unit values have been entered for each calibration point stored, the unit will automatically save the calibration.

NOTE: The display will prompt for Set PT No 0 when setting the first point. The first point in the calibration MUST be zero load. After all calibration points have been stored, the first Engineering unit value entered will be 0. The prompt for this will be PT(1).

Step 11: Unload the transducer so no force is applied. Press <ENTER> to take the zero reading. The left side of the display will indicate that PT1 has been read.

Step 12: Load the transducer to the desired force and press <ENTER> to set a calibration point (voltage measurement). The voltage value is NOT displayed but has been saved to nonvolatile memory. Write down the corresponding engineering unit value for each calibration point. Repeat this step until all readings are taken.

Step 13: Press <STORE> to exit the measurement mode if fewer than ten calibration points are used. The program will automatically proceed from Step 12 to Step 14 after the tenth reading.

Step 14: Input the corresponding engineering unit value for each measurement point. After all values have been entered, the program will automatically generate the corresponding scale factors and store them in permanent memory. .

DONE! READY TO VERIFY CALIBRATION

Step 15: To verify the calibration, exit the Indicating Screen, apply specific loads to the transducer, and compare the indicator’s reading with the standard..

Step 16: If you adjust one or more calibration points, use the Edit Calibration function from the Utils menu. This function allows you to edit load values for one, some, or all calibration points without repeating Steps 2-14.

5.2 What Occurs During Calibration

The calibration procedure allows up to ten calibration points to be entered. A straight line connects each successive pair of points, and the slope of each line is the calibration scale factor used for that region. This results in a piecewise linear function, which maximizes accuracy..

5.3 Saving Calibration Data

All calibration data can be transferred between the Morehouse GB2 High Stability Gauge Buster and a pc by using the optional GaugeSafe™ Data Exchange program.

6. Troubleshooting

Morehouse GB2 High Stability Gauge Buster Troubleshooting		
Problem Description	Possible Causes	Action
Load Reading Wrong	Calibration	Ensure that correct load calibration is selected. The Active Calibration # is displayed in the upper left of the live screen. The Morehouse GB2 High Stability Gauge Buster can store up to six load cell calibrations.
	Analog/Digital Electronics	Contact Morehouse technical support.
	Excitation Voltage bad	Contact Morehouse technical support.
	Load Transducer Cable	Replace/fix transducer cable NOTE: refer to See Electrical/Mechanical Data section of this manual for cable wiring information.
	Load Transducer	Replace load transducer
Load Reading Unstable	Calibration	Ensure that there is a valid calibration in the selected load channel. A valid calibration has at least two points, the first point MUST be zero, appropriate full scale and resolution settings and a good A/D count span between the points in the calibration.
	Analog/Digital Electronics	Contact Morehouse technical support.
	Excitation Voltage bad	Contact Morehouse technical support.
	Load Transducer Cable	Ensure that cable gain strap is properly wired for transducer being used. Replace / fix transducer cable. NOTE: refer to See Electrical/Mechanical Data section of this manual for cable wiring information.

7. Electrical/Mechanical Data

7.1 User Connections

The Morehouse GB2 High Stability Gauge Buster is housed in a sheet metal enclosure measuring 7.88 in W x 6.44 in H x 2.5 in Dp. It features a 2-line by 20-character display with a 24-key tactile keypad. All connections are found on the rear panel, as shown in Figure 7.1.1.

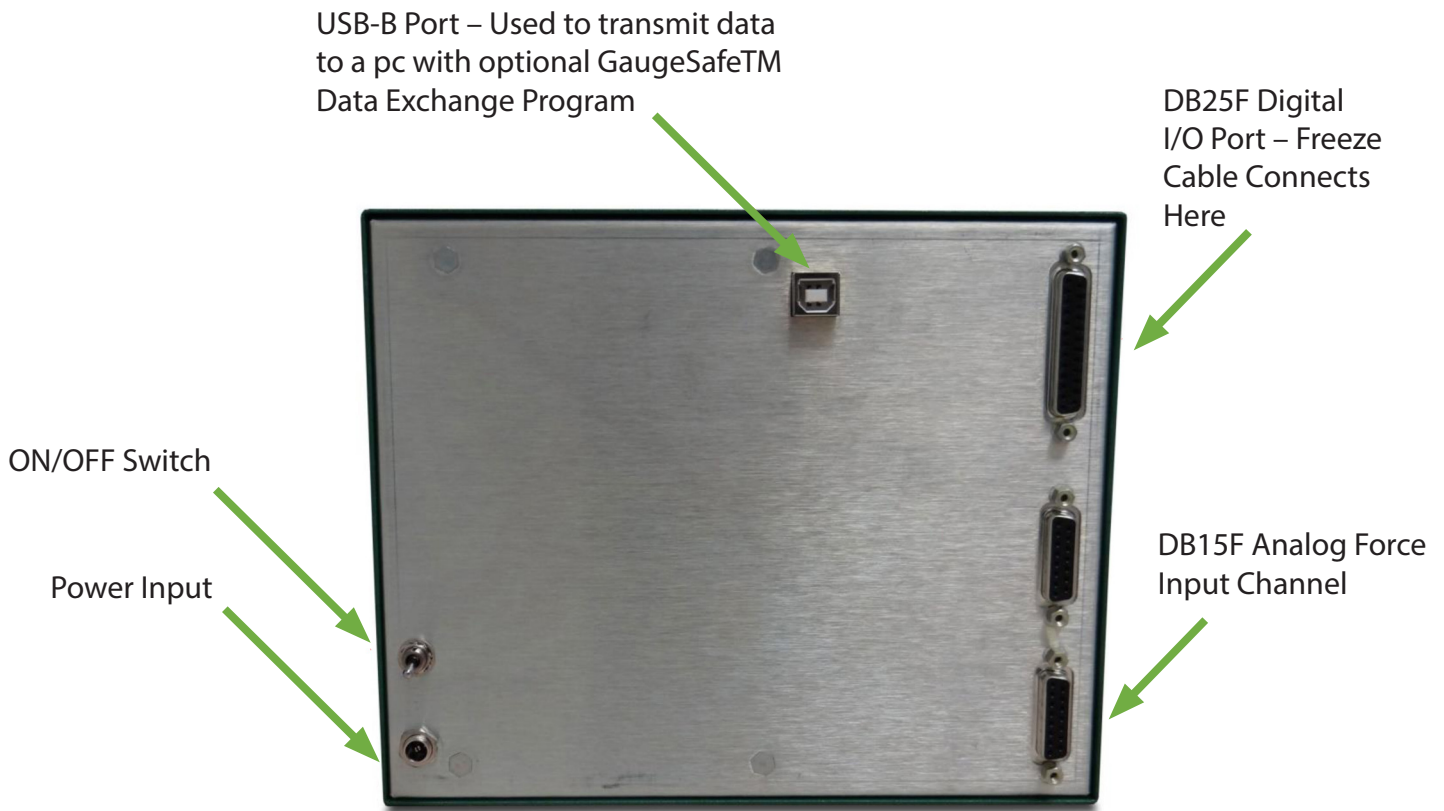


Figure 7.1.1 – Rear Panel Connections

Analog Input Connections:

Pin 1: IN-
Pin 2: IN+
Pin 9: +5V Exc
Pin 10: AGND

Input Range: 4.4 mV/V standard.
Contact manufacturer for other input range options.
Cable end requires a DB15 Male connector.
Connect all shields to chassis.

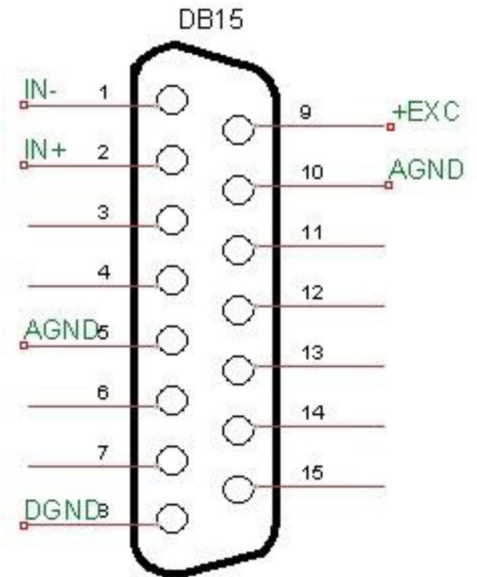


Figure 7.1.2 – DB15 Analog Input Connections.

7.2 Power (AC) Input

The Morehouse GB2 High Stability Gauge Buster uses a switching mode power supply. The following model is compatible with the indicator.

Manufacturer: Triad Magentics

Model No: WSU120-0700

Input: 100-240V 50/60Hz, 0.4A Max


Output: 12.0V DC 0.7 A

7.3 Password

Factory Password: 268

Use this for calibration and other password protected areas.

Morehouse suggests removing this page from the manual and placing it in a safe place.

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